

TRANSLATION FROM ARABIC ORIGINAL

MINISTRY OF ECONOMY & TRADE
DIRECTORATE GENERAL OF ECONOMY & TRADE
INTELLECTUAL PROPERTY PROTECTION SERVICE

CERTIFICATE
OF A PATENT OF INVENTION

The Minister of Economy and Trade;

In pursuance of decree No. 4 dated December 4, 1998 (forming the government)

In pursuance of Decree No. 6821 dated December 28, 1973, relating to the organization of the Ministries of Economy & Trade and Industry & Petroleum.

In pursuance of Order No. 2385 issued on January 17, 1924 and its amendments, relating to protection of Commercial and Industrial Property, as well as Article 14 thereof.

In pursuance of Order No. 152 issued on July 16, 1939 (Application of Paris Convention Agreement for the Protection of Industrial Property dated March 20, 1883)

In accordance with the application submitted on July 8, 1999, by Lawyer Mohamed Bassam Kabbara residing at Tripoli, Boulevard Street, acting in his capacity in the name and for the account of Mr. Fahim Kassis living in Australia

In accordance with Proces Verbal relating to the receipt of the said application, prepared by the Head of Intellectual Property Protection Service on July 8, 1999.

In accordance with the suggestion of the Director General of Economy & Trade

DECREES THE FOLLOWING

ARTICLE 1:

Mr. Fahim Kassis living in Australia, is granted a patent of invention relating to "Reinforced Concrete Element" for a period of fifteen years, commencing from the date of filing the application on July 8, 1999 and registered under No. 6063.

ARTICLE 2 :

The holder of this certificate is entitled to all rights and obligations stipulated in the abovementioned Order No. 2385 and its amendments, with the observance of the provisions of Article 14 thereof, which stipulates that this patent has been granted without any guarantee as to the genuineness merit or novelty of the said invention, or as to the fidelity or accuracy of the description thereof.

ARTICLE 3:

This Decree shall be published in the Official Gazette and served upon the party concerned.

Beirut, July 20, 1999

Minister of Economy & Trade
Sign & Seal

25045/1809

هذا هو القرار رقم ١٨٠٩/٢٥٠٤٥
استناداً لقراره رقم ١٨٠٩/٢٥٠٤٥

وزارة الاقتصاد والتجارة
المديرية العامة للاقتصاد والتجارة
مصلحة حماية الملكية الفكرية

قرار رقم
بمنح براءة اختراع

ان وزير الاقتصاد والتجارة ،
بناء على المرسوم رقم ٤ تاريخ ١٩٩٨/١٢/٠٤ (تشكيل الحكومة) ،
بناء على مشروع القانون المنفذ بموجب المرسوم رقم ٦٨٢١ تاريخ ٢٨ كانون الاول ١٩٧٣ ، (تحديد مهام
وملاكات وزارتي الاقتصاد والتجارة والصناعة والنفط) ،
بناء على القرار رقم ٢٣٨٥ الصادر في ١٧ كانون الثاني ١٩٢٤ وتعديلاته (نظام حقوق الملكية التجارية
والصناعية) ولا سيما المادة ١٤ منه ،
بناء على القرار رقم ١٥٢ الصادر في ١٦ تموز ١٩٣٩ (تطبيق اتفاق اتحاد باريس المتعلق بحماية الملكية
الصناعية المؤرخ في ١٨٨٣/٣/٢٠) ،
بناء على الطلب المقدم بتاريخ ١٩٩٩/٠٧/٠٨ من المحامي محمد بسام كباره المقيم في طرابلس-شارع
البولفار بصفته عاملاً باسم ولحساب السيد فهيم كاسيس المقيم في أستراليا

بناء على محضر ايداع الطلب المذكور المنظم من قبل رئيس مصلحة حماية الملكية الفكرية بتاريخ ١٩٩٩/٠٧/٠٨
بناء على اقتراح المدير العام للاقتصاد والتجارة ،

يقرر ما يأتي:

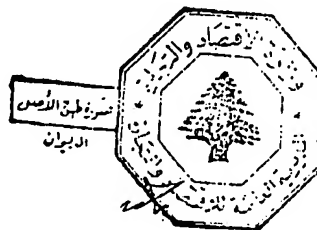
المادة الأولى: يمنح السيد فهيم كاسيس المقيم في أستراليا براءة اختراع تتعلق بتصميم مبتكر لخرسانه
مسلحه سابقة الصب والتجهيز بطريقة الدفع extrusion تستعمل في الاسقف والجدران
وخلافها locrete. وذلك لمدة خمس عشرة سنة تبدأ من تاريخ ايداع الطلب المقدم في

١٩٩٩/٠٧/٠٨ والمسجل تحت رقم ٢٥٠٤٥/١٨٠٩. العلم بأن هذا القرار رقم ١٨٠٩/٢٥٠٤٥
لعدم سريته الا في حق المصلحة المختصة. هذا القرار رقم ١٨٠٩/٢٥٠٤٥
يمنع حامل هذه البراءة بجميع الحقوق والواجبات المنصوص عليها في القرار رقم ١٨٠٩/٢٥٠٤٥
وتعديلاته، مع مراعاة احكام المادة ١٤ منه التي تتضمن ان هذه البراءة تعطي بدون
اثنى ضمانه في ما يختص بحقيقة الاختراع او فضله او ابتكاره ولا سيما في ما يختص
بأمانة وصفه او صحته .

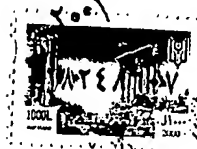
المادة الثالثة: ينشر هذا القرار في الجريدة الرسمية ويبلغ الى صاحب العلاقة.

بيروت، في ٢٠ تموز ١٩٩٩
وزير الاقتصاد والتجارة

د. ناصر السعيد



رئيس مصلحة الملكية الفكرية
سكوى رحال / طرابلس



ترجمة مختصرة عن الأصل

وصف براءة اختراع

LOCRETE

لوكريت

١- مقدمة : يتضمن الاختراع الاستفادة القصوى من مواد الخرسانة المسلحة، وذلك بابتكار الحلول لتصميم شكل Form خاص . والابتعاد عن الاستعمال المتكرر والهدر الحاصل في صب واستعمال الكونكريت وتخفيض فترة البناء خاصة للجدران والاسقف والحوائط والأسوار الخ ...

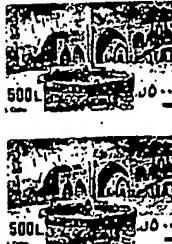
٢- الخواص الفيزيائية والفنية :

ان الاختراع يتميز بالخواص التالية :

ان عناصر ومواد الاختراع هي خرسانة مسلحة سابقة الصب بشكل شبه دائري مع استواء من الاعلى والاسفل قطر ٣٥ مم علو ٦٠ مم ، بحيث يكون السقف الاعلى للصة مستوياً بسعة ٥٠ مم . أما طول الصبة فمتغير حسب الحاجة من ١٠٠ مم الى ٤٠٠٠ مم على سبيل المثال .

ويكون الصب حسب طريقة الصب العادية وباستعمال نفس المواد ولكن بطريقة الحقن أو الدفع .

وعندما تكون الصبة على أساس انتاج اعداد كبيرة وبطريقة الحديد سابق الاجهاد فإن السعة للصة يمكن زيادتها الى طول ٦ أمتار .



٢٧ آذار

أما فيما يتعلق بقر القضيبي وفي نهايته سيكون هناك وجه منبسط بعمق ١٠٠ مم وعرض ٥٠ مم، ويكون القضيبي الحديد في منتصف الصبة .
وتكون قياسات قضيبي الحديد متغيرة حسب الطلب من ٨ مم الى ١٢ مم حسب الجدول التالي :

الوزن بالكلغ	طول الصبة
٠٤,٣٥	٠,٥٠ مم طولي
٠٨,٧٠	١,٠٠ مم طولي
١٣,٠٥	١,٥٠ مم طولي
١٧,٤٠	٢,٠٠ مم طولي
٢١,٧٥	٢,٥٠ مم طولي
٢٦,١٠	٣,٠٠
٣٠,٤٥	٣,٥٠

علماً بأن قوة تحمل الضغط للقضيبي هو ٣٠٠ كلغ أو أقل تبعاً لمتطلبات المنشأ .

الخلطة :

ان صب الخلطة الخرسانية تمليها طبيعة المكونات مثل الرمل البحص الاسمنت الطقس، الماء .

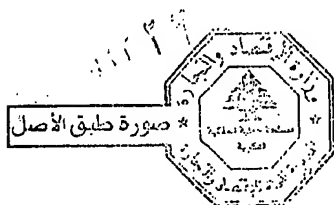
وتكون صبة لوكريت LOCRETE بقالب على أساس الصب بالموقع (المكان) أو سابقة الصب، سواء للجدران أو للأسقف وخلافها .

٣- التطبيقات العملية :

اضافة لاستعمالات لوكريت في البناء، هناك مناطق أخرى لاستعمالات لوكريت

مثل :

١- الاسوار



٢- المخازن

٢- الارصفة

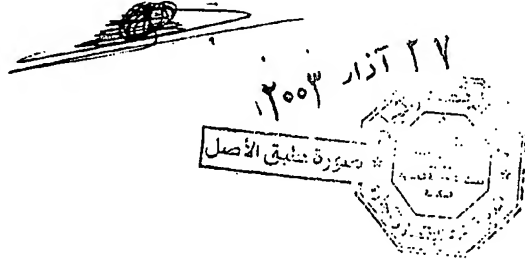
٤- حوامل الاشجار وكروم العنب .

٤- مقارنة الوفورات في التكاليف :

عند استعمال طريقة لوكريت فسوف يكون هناك وفر في تكاليف البناء وفي الوقت المنصرف، حيث تبين من الدراسة أن الوفر سيكون في المتر المكعب ٤٩ دولار أميركي (اسعار منطقة كالكويت مثلاً) بنسبة خفض ٤٠٪ اربعين بالمائة .

٥- المزايا البيئية ل لوكريت :

تخفض هذه الطريقة استعمال الخشب كقالب لصب الحوائط والأسقف وبالتالي تحافظ على الغابات والتقليل من استعمال الخشب في البناء .



قائمة بالادراج المودعة طلب براءة اختراع لوكريت LOCRETE
عدد الصفحات ٣
١٥

١- ترجمة مختصرة عن أصل تفاصيل الاختراع

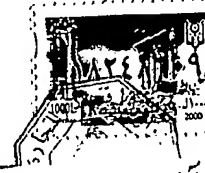
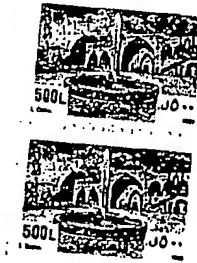
٢- ملف يتضمن وصف تفصيلي للاختراع ، ملف
يتضمن وصف تفصيلي للاختراع باللغة الانكليزية
يتضمن المدة والمواصفات الفنية والميزانية
وطريقة التنفيذ وطرق الإنتاج والمعدات
المالية مع أي ليد والإعانات التي لميسرة
النتيجة والمطلوبات

٣- ومخطط تفصيلي للاختراع بمختلف مغلقة متهم

٤- وادخل المدة المدة التالية المطلوب تسجيلها
LOCRETE لوكريت

٥- أصل المدة من طالب التسجيل للمكي محمد بن بكاء





٥٠٠٠ طابق الأصل

٢٢ آذار ٢٠٠٧

LOCRETE

3- Mode of production

For limited production of the Locrete element and for any individual, wishing to construct his own home unit the means and the process of production are so easy and straightforward. In fact any one person could produce the Locrete elements in his own backyard. Production is achieved by means of acquiring readily available plastic pipe moulds. The moulds are formed and cut to the lengths required. The moulds will be repeatedly used. The details of forming the moulds and their respective arrangement are set in the attached drawings attached with this submittal. These moulds are accessible to any person interested in producing Locrete for limited use. With a small size mixer or by means of manual mixing, one man should be able to produce of 40 sqm of the Locrete elements with the lengths that are required by him.

K 250 concrete strength should be adequate for wall paneling.

K 300 should be adequate for roof slabs.

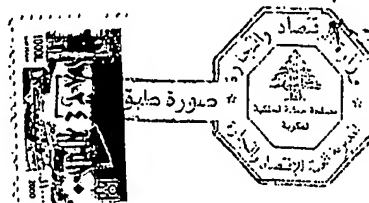
Once the moulds are fabricated and arranged on the casting floor, that is specially prepared for the purpose, the reinforcement is set in position, the mixing and casting of concrete commences. The concrete shall be retained in the moulds for a period of three days. During which time the concrete shall be regularly cured. After three days the concrete could be castoff the moulds and stacked for future use. The moulds would then be re-arranged and recast as the need may be.

It is recommended that the concrete casting take place in a shaded area.

Locrete elements would be produced as individual elements. In case of mass production for wide scale commercial purposes, the elements would be produced in slabs. The slabs would be 1.5, 2.0, 2.5, 3.0, 3.5, or 4 meters long and may be up to six meter long, to a width that is limited only by the practicality of transporting and installing the slabs, and as may be required by the plan layout of the roofs. In mass production a process of concrete extrusion would be utilized. Pre-stressed steel will be used for reinforcement of the Locrete elements or slabs.

The Locrete slabs and roofing system will be provided with the required sheer connection detail.

It is worth noting that one cubic meter of concrete will produce 140 Locrete units, with each unit being two meters long. The width of one unit being 72 mm, The area covered with one cubic meter would be 20 square meters. The steel content in one CM when using 12-mm steel bars would be KG 125. When using 8-mm bars, steel content would be KG 55/CM.



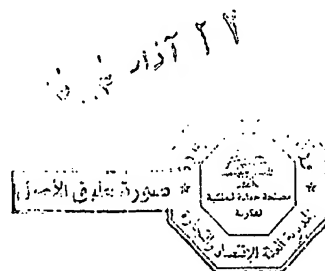
service load capacity (single span)

topp. Fcu 250
Fy 4200

Muc 1960

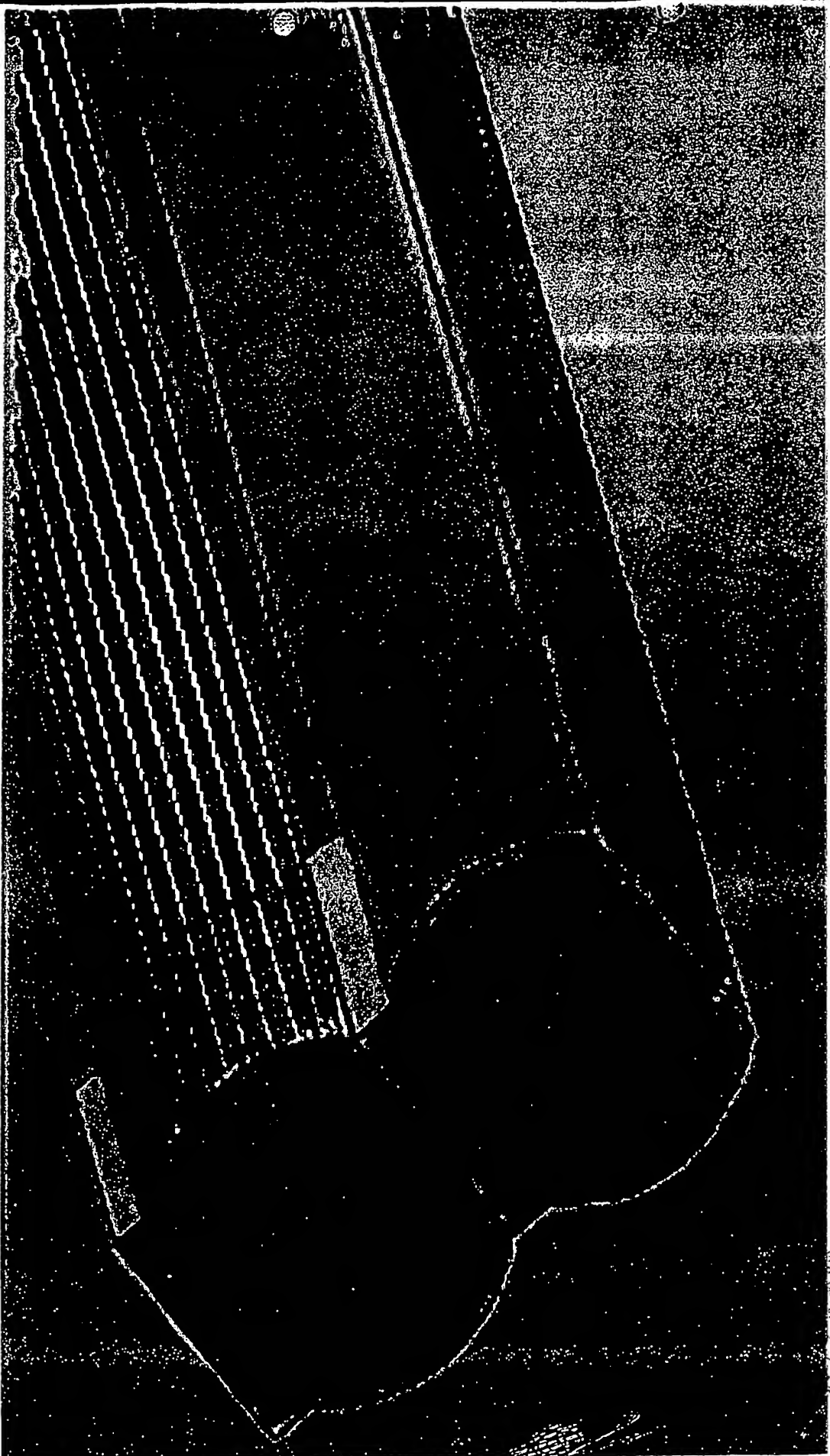
Xbar 7.69

span	topping	log bar	Mbot/m	sand. o.w.	serv. Load	effe. lxx	l/240	serv. Defl.
230	4	0.5	473	223	493	8887	0.96	0.23
240	4	0.5	473	223	434	8887	1.00	0.25
250	4	0.5	473	223	383	8887	1.04	0.27
260	4	0.5	473	223	337	8887	1.08	0.30
270	4	0.5	473	223	296	8887	1.13	0.32
280	4	0.5	473	223	260	8887	1.17	0.34
290	4	0.5	473	223	227	8887	1.21	0.37
230	4	0.6	658	223	772	8887	0.96	0.32
240	4	0.6	658	223	691	8887	1.00	0.35
250	4	0.6	658	223	619	8887	1.04	0.38
260	4	0.6	658	223	556	8887	1.08	0.41
270	4	0.6	658	223	499	8887	1.13	0.44
280	4	0.6	658	223	449	8887	1.17	0.48
290	4	0.6	658	223	403	8887	1.21	0.51
230	4	0.8	1064	223	1386	8887	0.96	0.52
240	4	0.8	1064	223	1254	8887	1.00	0.57
250	4	0.8	1064	223	1139	8887	1.04	0.62
260	4	0.8	1064	223	1036	8887	1.08	0.67
270	4	0.8	1064	223	944	8887	1.13	0.72
280	4	0.8	1064	223	862	8887	1.17	0.77
290	4	0.8	1064	223	789	8887	1.21	0.83



Best Available Copy

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١٩٦١
١٠٠٠





Patent Office
Canberra

I, SMILJA DRAGOSAVLJEVIC, TEAM LEADER EXAMINATION
SUPPORT AND SALES hereby certify that annexed is a true copy of the
Provisional specification in connection with Application No. PQ 2579 for a
patent by FADI KASSIS as filed on 02 September 1999.



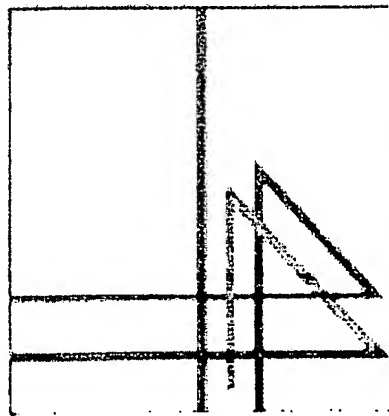
WITNESS my hand this
Nineteenth day of March 2003

S. Dragosavljevic

SMILJA DRAGOSAVLJEVIC
TEAM LEADER EXAMINATION
SUPPORT AND SALES

An Innovative Design in Reinforced Concrete Element

لوكریت
LOCRETE



AN INNOVATIVE DESIGN IN REINFORCED CONCRETE ELEMENT

This presentation is an introduction to *Locrete* system made for the purpose of assessing the potential for Intellectual Property Protection of the design of this system.

PRESENTED to: Interested Party/Parties

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KUWAIT, 15 August 1999

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Introduction

This presentation by the designer of **Locrete** summarises the benefits of a solution for an optimum utilisation of reinforced concrete material.

The premise starts with the fact that most building construction techniques, forms of elements, utilisation of materials and optimisation on efficiency have been hampered mainly by the users and developers who depend mainly on imitation and learning by set example. The technical research in relation to reinforced concrete, being extensive and broad, focused around knowing the physical characteristics and rarely the practical optimal applications.

To date various attempts on maximising the benefits and minimising the cost in terms of ease of production, minimal usage of the raw materials coupled with achieving the ultimate performance with ease of construction, have been relatively slow and in most cases lacked in novelty. It is also true that the academic bounds have contributed to dominance of linear approach to research and development in the construction industry.

The motives behind the premise at hand and the nature of things characterising present *modus operandi*, which are persistently residing in the construction industry of current techniques, clearly establish the following facts:

- Major negative environmental impact is being inflicted daily on the world forestry considering the extent of wood used for formwork.
- In most cases the utilisation of reinforced concrete in construction projects mandates the use of heavy equipment, extensive labor and technical expertise.
- Substantial capital is a pre-requisite for any construction project. This renders construction a prohibitive venture to the average or low-income people of the world.
- Due to the intricate technical complexity of the reinforced concrete material, it tends to require special technical skills for it to be utilised in an end-user friendly manner.
- In most cases the lack of understanding of the characteristics of the material poses a major hardship to the end users. In that respect the industry suffers either over expenditure of material cost or under-utilisation of the material cost. In the former case, money is spent unduly and in the latter unfavourable results are witnessed.
- With the prevailing *modus operandi*, time is another factor that mostly contributes to the high cost of the product. It takes a relatively long time to create the moulds (formwork), pour the concrete and then wait for it to gain its final strength.
- Individually, the above factors are problem areas. Since these factors inherently act inter-dependently, they exacerbate the problem to prohibitive levels and practices. It cannot be claimed that the proposed premise eliminates the total volume of these inherent problems, but it does curb a major part of the negatives in each item; and when combined, the end result has a positive impact on the state of the art.

Physical and Technical Characteristics

Physical Attributes

The proposed element is a pre-cast reinforced concrete with a special form design. The basic characteristics of the design are as follows:

- Easily produced
- It does not require a major technical know how for either the production or the construction.
- It uses the optimum section utilisation of reinforced concrete.
- It is easy to transport and handle without the use of any heavy equipment unless in mass production.
- It is economically efficient to fabricate and build and is maintenance free. The product is versatile in that it is ideal for slabs construction, wall partitions, fence structures and many other usage.

Weights in Units of Length

Length	Weight (kg)
0.50 meter long	04.35
1.00 meter long	08.70
1.50 meter long	13.05
2.00 meter long	17.40
2.50 meter long	21.75
3.00 meter long	26.10
3.50 meter long	30.45

Crushing Strength

The crushing strength of the bar is 300 K or less depending on the structural need

The Mix

The mix proportions will be dictated by the weather temperature and the nature of the ingredients, such as sand, crushed lime stone, gravel, etc. In most cases the strength of concrete shall be the decisive factor.



Mode of Production

For limited production of the **Locrete** element and for individuals, wishing to construct their own home unit, the means and the process of production are simple and straightforward. In fact any one person can produce the **Locrete** elements in his/her own backyard. The technique is dependent on moulds that are designed to be used and reused with minimal technical expertise required and no deterioration to the moulds. Production techniques would be explained and stated in due course.

The details of forming the moulds and their respective arrangement shall be provided in due course. These moulds are accessible to any person interested in producing **Locrete** for limited use. With a small size mixer or by means of manual mixing, one person should be able to daily produce 40 sqm of the **Locrete** elements with the lengths that are required for the purpose.

K 250 concrete strength should be adequate for wall paneling.
K 300 should be adequate for roof slabs.

Once the moulds are fabricated and arranged on the specially prepared casting floor, the reinforcement is set in position and the mixing and casting of concrete commences. The concrete shall be retained in the moulds for a period of three days, during which time the concrete will be regularly cured. After three days the concrete can be cast off the moulds and stacked for future use. The moulds will then be rearranged and recast as is required. It is recommended that the concrete casting takes place in a shaded area.

Locrete elements will be produced as individual elements. In case of mass production for wide scale commercial purposes, the elements will be produced in slabs. The slabs range from 1 meter long up to 5 meters long and the width is anywhere between 0.6 meter wide up to 2 meters wide. All dimensions will be limited only by the practicality of transporting and installing the slabs and by the structure plan layout. In mass production a process of concrete extrusion will be utilized. This also results in a categorical improvement of the spans acquired from pre-stressing the reinforcement steel.

It is worth noting that one cubic meter of concrete will produce 140 **Locrete** units, with each unit being two meters long. The area covered with one cubic meter will be 20 square meters. Reinforcement steel content will be an optimum value and function of the span.

Mode of Construction

The **Locrete** element can be used as a nonstructural element in walls and floors or as a structural element in slabs. The two basic applications for the element are wall closing and slab construction. In the first utilisation option, the **Locrete** units will have to be framed with cast in place, or pre-cast structural frames, i.e. columns and beams.

Wall Closing

The **Locrete** elements are laid one on top of the other (either dry or with mortar) and are clipped at the ends by means of concrete mortar. Dry construction of **Locrete** elements do not require any technical expertise since the elements will be fit in place by means of the groove provided in the frame reinforced concrete columns. The elements will be grab jointed at both ends by the specially molded column form and the concrete mortar that will be constructed along within the column groove and around the **Locrete** elements. (Refer attached drawings for clarification). Once the **Locrete** elements are built to the full height of the wall, and the ends are fixed with mortar, the outer face will be plastered to the preferred thickness.

Plastering will help in filling the joints and creating a weather tight wall. Windows may be opened in the wall by using special temporary templates in the process. The element can either be cut on site or fabricated to the window side length ahead of time. There will be no special framing system for the windows since the elements, once plastered, will produce the required window frame thickness. A sub-frame will be installed in the normal standard practice and the window will be fixed to the sub-frame as required. On the inside, depending on the standard of insulation needed for the building envelope, the necessary insulation material will be constructed. Alternatively the inner face may be left without any treatment and / or plastered to produce a high quality internal finish.

Similarly, **Locrete** elements can be used as internal partitions. Plaster painting the partitions will produce a 100-mm wall thickness. Door openings can be produced with the help of the wooden frames, which will be fixed to the wall on one side and the column on the other side.

In the case of walls the elements will be laid horizontally as vertical laying of elements will complicate window openings and other matters for no valid reason.

Use in Structural Slabs

The **Locrete** elements will be used in the structural slabs as follows:

- Based on the slab plans and the finishing beneath the slabs, the length of the **Locrete** elements will be decided and accordingly cast in the fabrication yard. All fabrication of the elements shall be in all cases based on the pre-designed / required length. Moreover, cutting the elements to the required length on site is easy and can be achieved by means of an electric disc saw.
- The **Locrete** elements are laid horizontally in a butt-joint manner to the full length and width of the slab area. If the clear span between the two-end supports of the element is 2.5 meter or more, an intermediary support will have to be provided temporarily until the plain concrete slab portion on top of the **Locrete** units is poured and cured.

The spans between the end supports of the elements shall not exceed 4.5 meters and can go to seven meters if production takes place in factories and pre-stressed steel reinforcement and steam curing are utilised.

Details of structural characteristics will be provided in due time.



Functional Utilisation

Further to the established functional utilisation of the **Locrete** element in the building construction the following areas of use are also acceptable and will contribute greatly to an economic solution in the following fields:

- Fencing posts and runners
- Warehouse wall closure.
- Warehouse roof trusses
- Shoring panels closing between vertical structural supports.
- Pavements substructures
- Fruit tree groves and vineyards.

Economic, Logistic & Quantitative Analysis

The following tables pronounce the economic facts in relation to the **Locrete** elements:

Description	1 meter long	m ²	Steel Reinforcements	Steel Reinforcements
Concrete content	0.003628cm	0.049cm	8-mm 0.00005kg	12-mm 0.000113 kg
1 cubic meter conc.	280 Locrete units	20.00 area	8-mm 55kg	12-mm 125 kg
1 cubic meter in concrete blocks 10*20*40	166 units	13.33 area	Not applicable	Not applicable

Locrete versus 10 cm block work for wall paneling

The price analysis introduced here is applicable in the Arabian Gulf countries. Similar analysis will have to be drawn for Australia if the potential of the **Locrete** IPP is validated.

Concrete bloc work rate per square meter, fabricated and constructed, is US\$ 10.0. One cubic meter of concrete yields 13.5 square meters of 100 mm block work. Therefore the cost of constructing one cubic meter concrete bloc is US\$ 140.0.

To build one square meter of **Locrete** will cost US\$ 3.30. One cubic meter of concrete will yield 20 square meters of **Locrete** wall area. The cost of that is US\$ 62.30

The economy in one square meter rate is 67% of the cost of the classical bloc work
The economy in one cubic meter is $((140-62.3)/(140.00)) = 56\%$

A waste of 10% in the bloc work is allowed for. No waste is envisaged in the **Locrete** system.

The following logistic factors are of a major importance and are not catered for in the calculations:

- The bloc work construction is a wet trade. **Locrete** on the other hand is a dry trade. This will minimise the messiness on sites and will save on water consumption.
- The bloc work requires plastering in most of the cases considering the aesthetic side of the construction. **Locrete** can stay without plaster on the interior when providing for low cost housing, and still maintains an aesthetically acceptable look.
- Bloc work requires seven days curing time before it is allowed to be plastered. **Locrete** can be plastered instantly.
- Transportation and handling costs are also reduced simply considering that less material will be transported.

Double skin exterior walls

In many parts of the world where weather conditions are extreme the standard construction utilised for external walls comprises of 150 mm on the external skin and 100 mm on the internal skin, with insulation material such as polystyrene in between. When the two layers are replaced with **Locrete** elements, the saving in the combination is as follows: -

Description	1 meter long element	m ² each sides	Steel Reinforcement
Reinforced Concrete content both sides	0.007256 cm	0.098 cm	8-mm 0.00005kg
2 cubic meter reinforced concrete.	560 Locrete units	20.00 area	8-mm, 55kg
1 cubic meter in concrete blocs 10*20*40cm	166 units	13.33 area	Not applicable
1 cubic meter in concrete blocs 15*20*40 cm	154 units	12.32 area	Not applicable

From the table above we notice that 2 cubic meters of **Locrete** will cover 40 square meters. While 2 cubic meters of bloc-work will cover 25.65 square meters of wall area. Assuming that the insulation and plaster are constant in both cases, then with simple area analysis we have an economy of 7.50 square meters on top of 12.82 square meters of bloc work area for each one cubic meter of concrete. Knowing that 1 square meter of bloc work costs US\$ 10.00 in constructed form, we would accumulate a benefit of US\$ 49.00 per cubic meter. This value divided by the total cost of a cubic meter of US\$ 121.00 will give a benefit yield of 40% of the cost of a meter cube of concrete in bloc work.

On the other hand constructing 20 square meters of bloc work in walls will cost US\$ 196.72, while one cubic meter of **Locrete** in walls is at US\$ 66.00. The yield in economic benefit is $((196.72-66.00)/(196.72)) = 66\%$ of cost of square meter. This figure comprises of 40% economy on material and 26% on labor cost.

Roof Slabs

If we simulate the study for the structural slabs, the following argument will hold true.

The following items will be eliminated:

- The labor rate for the carpenters forming slabs estimated at a minimum of US\$ 42.80 per cubic meter
- The need for wood for formwork at US\$ 18 per cubic meter.

Also, a minimum of 30% of the concrete used in the similar span solid slabs will be reduced by one third, yielding a saving in concrete quantity and in reinforcement of US\$ 35.00 / cubic meter.

Total direct saving of labor, formwork and the reduction in quantities in slab concrete and reinforcement steel is US\$ 95.80 This will produce a yield saving of 64% of the prevailing cost of cubic meter of concrete compared to the classical slab system.

In consideration of the substantial direct saving in quantities, there is an indirect saving effect that results from the reduction in the concrete and reinforcement quantities and the dead load resulting from the partitions. A proportional reduction to the foundation and the framing structure will result from the elimination of dead weights on walls and on slabs. This will yield a minimum saving of 25% of the concrete and reinforcement value for the foundations and the framing of the structure. US\$ 15.00 per cubic meter in the foundation and the framing system are allowed for in this calculation. To that, one needs to add the benefits listed under the previous point of analysis.

This analysis does not cater for the following factors: -

- Ease of construction
- Speed of construction
- Environmental benefits
- User friendly in relation to method of construction
- Ease of transportation and handling of the element.
- Elimination of a major part of technical expertise required for the performance of the works. This will allow a broader cross section of the world people to be involved in building major and most difficult part of their dwelling units.



The Environmental Impact Of *Locrete*

The reinforced concrete, as in the prevailing world environment, is considered one of the most needed materials in the building industry. It is also one of the most expensive to acquire in its final form. The prohibitive cost of reinforced concrete and the inherent difficulty in understanding the technical characteristics exacerbate the problem. People of the world, particularly those in the low income bracket are the first to suffer from the previously mentioned factors. Governments all over the world shudder when they plan to provide dwellings for their citizens and fail when confronted with the prohibitive costs. Political and economic havocs are born when people lack on decent domicile.

The introduction of *Locrete* is meant to reach the low income bracket of the world population by giving them a much less expensive way in acquiring and building their respective home units with reinforced concrete. The *Locrete* solution will help also developers around the world build more with less time and money. *Locrete* curbs the difficulties involved in the technology to a major extent. It does not eliminate all the problem but makes the solution much more attainable by the end users. It provides a standard solution to the walls and slabs in any standard structure and in particular modular structures.

The fact that the formwork for slabs, and in many parts of the world for walls construction is relatively eliminated, a major saving on the use of wood for concrete construction purposes is achieved. This, on its own merit, will reflect positively on the issue of world forestry depletion.

Construction of block work produces major quantities of excess waste, resulting from block work and mortar breakage. In the case of *Locrete* no excess waste will be witnessed.



C o n c l u s i o n A n d R e q u i r e m e n t s

This presentation is preliminary. In actuality the designer, once in possession of the required legal intellectual protection, will assume full responsibility to present the various cases where **Locrete** will be used to fill the gap that has adversely affected economic building construction around the world. This is specifically valid where time, resources and technical know-how are major constraints in the building process.

To this end the designer wishes to approach the various patent agencies to acquire the legal protection of his property, which is an intellectual novelty in pre-cast reinforced concrete elements.

EXHIBIT I

Structural analysis of a *Locrete* unit under different conditions

The table showing the structural behavior of the element in its different lengths and reinforcement conditions is prepared and would be submitted in due course.



Model Drawings

Adjourned, to be transmitted in due course

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Trade Mark (proposed)

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LOCRETE

